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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/533,182	04/27/2005	Seiji Sugiura	TOW-108USRCE	4456

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EXAMINER	
HAN, KWANG S	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/533,182	SUGIURA ET AL.	
	Examiner	Art Unit	
	Kwang Han	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 June 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

FUEL CELL HAVING INLET AND OULET BUFFERS

Examiner: K. Han SN: 10/533,182 Art Unit: 1795 August 11, 2009

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 5, 2009 has been entered. Claims 1 and 14 were amended.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Specification

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: FUEL CELL HAVING COOLANT INLET AND OUTLET BUFFERS ON A FIRST AND SECOND SIDE.

Claim Rejections - 35 USC § 103

4. The claim rejection under 35 U.S.C. 103(a) as unpatentable over Inoue et al. in view of Enjoji et al. and Sha et al. on claims 1-15 is withdrawn, because independent claims 1 and 14 have been amended.

5. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al. (US 2001/0044042) in view of Enjoji et al. (US 2003/0129475) and Voss et al. (US 5230966).

Regarding claim 1, Inoue is directed to a fuel cell comprised of the following:

- a electrolyte electrode assembly (12) and separators (14, 16) stacked alternately (Figure 1) [33],
- the electrolyte electrode assembly includes an anode (22), a cathode (20), and an electrolyte (18) interposed between the electrodes [34],
- a fuel gas supply passage (36a) [38],
- a oxygen-containing gas supply passage (38a) [40],
- a coolant supply passage (40a) [45],
- a fuel gas discharge passage (36b) [38] ,
- an oxygen-containing gas discharge passage (38b) [38],
- a coolant discharge passage (40b) [37],
- the passages extending through the fuel cell in the stacking direction (Figure 1),
- the separator including a first and second plate (14, 16) stacked together (Figure 6) [33],

- the first metal plate (14) has an oxygen-containing gas flow field including a curved flow passage (Figure 3),
- second metal plate (16) has a fuel gas flow field including curved flow passage (Figure 4), and
- a coolant flow field with straight flow grooves (Figure 5).

Inoue is silent towards the use of inlet and outlet buffers for any of the fluid passage.

Enjoji et al. teaches the use of buffers at the inlet and outlet regions of the coolant passage grooves in a fuel cell for the benefit of supplying fluids into the surfaces of the separators along the passage grooves uniformly [0008] but is silent towards having buffers which are separate from each other. It would have been obvious to one of ordinary skill in the art at the time of the invention to apply Enjoji's buffers to each inlet and outlet passage as required in Inoue's coolant supply passages for the benefit allowing for uniform distribution of coolant fluids in the fuel cell.

Voss teaches a coolant flow field plate for a fuel cell which has a coolant inlet (60) with distribution channels (61) which feed to a coolant outlet (62) (Figure 4) which diverge and run along the perimeter of the plate to form separate coolant paths (6:18-27) for the benefit of imposing lower temperatures near the periphery of the cell plates to protect the integrity of the seals. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide coolants path which diverge and form separate sections within the flow field plate of Inoue and Enjoji because Voss teaches this allows for imposing lower temperatures near the periphery of the cell plates to

protect the integrity of the seals. The combined teachings provide a structure having two inlet buffers and two outlet buffers on opposite sides of the coolant inlet and outlet.

Regarding claim 2, the teachings of Inoue, Enjoji and Voss as discussed above are herein incorporated. The buffers of Enjoji are taught to be applied around the passage inlets and outlets in order to supply fluids and can be applied to both separator plates (14, 16) of Inoue. The positions of the second buffers on the second plate would have to be different from the first set of buffers on the first plate because when the plates are brought together the buffers would interfere with each other if they were in the same positions.

Regarding claim 3, the teachings of Inoue, Enjoji, and Voss as discussed above are herein incorporated. Inoue is silent towards the use of buffers for the gas supply passages.

Enjoji et al. teaches the use of buffers at the inlet and outlet regions of fluids including fuel gas and oxygen-containing gas for the benefit of supplying fluids into the surfaces of the separators along the passage grooves uniformly [0008]. It would have been obvious to one of ordinary skill in the art at the time of the invention to apply Enjoji's buffers in Inoue's fuel gas supply passage for the benefit of minimizing stagnation of the fuel gas and uniform distribution.

Regarding claim 4, Inoue teaches a fuel gas flow field (Figure 4) and an oxygen-containing gas flow field that includes a serpentine flow passage (Figure 3).

Regarding claim 5, the teachings of Inoue, Enjoji, and Voss as discussed above are herein incorporated. Inoue teaches the use of serpentine flow passages which

decrease as the passage approaches the outlet (Figures 3 and 4) but is silent towards the number of grooves or passages decreasing then increasing.

Enjoji teaches the use of passages which are formed by protrusions and guide ribs [22] which can vary depending upon the path the coolant takes (Figure 4) to sufficiently cool the fuel cell. Enjoji further teaches number of passages which decreases at the coolant initially enters the coolant flow field for allowing entry of coolant (Figure 4, near the coolant entry, 20a) then the number of passages increase to allow the coolant to travel through the more interior passages for providing coolant to a larger region.

It would have been obvious to one of ordinary skill in the art at the time of the invention to apply Enjoji's decreasing then increasing of the number of coolant passages in Inoue's fuel cell to allow for entry of and then the distribution of coolant over the coolant flow field. Furthermore, it would also have been obvious to one of ordinary skill in the art at the time of the invention to decrease or increase the number of grooves in the flow passage since it has been held that discovering the optimum ranges for a result effective variable such as the number of grooves involves only routine skill in the art in the absence of showing of criticality in the claimed range (MPEP 2144.05). The configuration of the flow passage using grooves would depend in the cooling requirements for the fuel cell.

Regarding claim 6, Inoue teaches a fuel gas flow field and oxygen-containing gas flow field that includes a substantially U shaped flow passage (Figures 3 and 4).

Regarding claim 7, Inoue teaches a fuel cell where the first and second metal plate (14, 16) (Figure 6) has a horizontally long rectangular shape (Figures 3, 4, and 5) and stacked in a horizontal direction [33] (Figure 1).

Regarding claim 8, Inoue teaches that among the six passages for the gas flow passages three passages extend through a left end of the first and second plates and the other three passages extend through a right end of the first and second plates (Figures 3, 4, 5).

Regarding claim 9, the teachings of Inoue, Enjoji, and Voss as discussed above for claim 1 above is herein incorporated.

Enjoji teaches the use of passages which are formed by protrusions and guide ribs [22] which can vary depending upon the path the coolant takes (Figure 4) to sufficiently cool the fuel cell. Enjoji further teaches number of passages which decreases at the coolant initially enters the coolant flow field for allowing entry of coolant (Figure 4, near the coolant entry, 20a) then the number of passages increase to allow the coolant to travel through the more interior passages for providing coolant to a larger region teaching it a result effective variable.

It would also have been obvious to one of ordinary skill in the art at the time of the invention to decrease or increase the number of grooves in the connection passage between the inlet buffer and the coolant passage since it has been held that discovering the optimum ranges for a result effective variable such as the number of grooves involves only routine skill in the art in the absence of showing of criticality in the claimed

range (MPEP 2144.05). The configuration of the connection passage using grooves would depend in the cooling requirements for the fuel cell.

Regarding claim 10, the teachings of Inoue, Enjoji, and Voss as discussed above are herein incorporated. Inoue further teaches a fuel cell comprised of the following:

- a oxygen-containing gas flow field (42) including a curved flow passage formed on the surface of a first metal plate (14) (Figure 3), and
- a fuel gas flow field (60) including a curved flow passage on the surface of a second metal plate (16) (Figure 4).

Regarding claim 11, the applicant is directed to the discussion above for claim 4.

Regarding claim 12, the applicant is directed to the discussion above for claim 7.

Regarding claim 13, the applicant is directed to the discussion above for claim 8.

Regarding claim 14, the teachings of Inoue, Enjoji, and Sha as discussed above are herein incorporated. Inoue further discloses a fuel cell that has the same number of turn regions between the oxygen-containing gas flow field and the fuel gas flow field (Figures 3 and 4).

Regarding claim 15, the applicant is directed to the discussion above for claim 8.

Response to Arguments

6. Applicant's arguments with respect to claims 1-15 have been considered but are moot in view of the new ground(s) of rejection.

Contact/Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kwang Han whose telephone number is (571) 270-5264. The examiner can normally be reached on Monday through Friday 8:00am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on (571) 272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. H./
Examiner, Art Unit 1795

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1795